CLAIMS

What is claimed is:

1. A radio-frequency receiver having an integrated circuit IF filter, said radio-frequency receiver comprising:

a semiconductor substrate;

a downconversion mixer having an input and an output;

a tunable local oscillator coupled to said mixer input;

an intermediate frequency filter having an input coupled to said mixer output, said intermediate frequency filter being formed on said semiconductor substrate using a resistor-forming semiconductor process;

a process-variant circuit having an input and an output, said process-variant circuit being formed on said semiconductor substrate using said resistor-forming semiconductor process; and

a control circuit having an output and an input coupled to said process-variant circuit input and output, respectively, and having an output coupled to said tunable local oscillator, said control circuit being configured to initialize said process-variant circuit, then monitor performance of said process-variant circuit and determine a tuning parameter for said tunable local oscillator based upon said performance of said process-variant circuit.

2. A radio-frequency receiver as claimed in claim 1 wherein said control circuit and said tunable local oscillator are mutually configured so that said tuning parameter causes said tunable local oscillator to generate a local oscillator signal oscillating at a frequency that causes said downconversion mixer to produce an IF signal oscillating at a

frequency approximately equal to a center frequency of said intermediate frequency filter.

3. A radio-frequency receiver as claimed in claim 1 wherein:

said radio-frequency receiver additionally comprises a process-invariant circuit configured to generate a reference signal substantially unaffected by variations in said resistor-forming semiconductor process; and

said control circuit is further configured to monitor said reference signal so that said tuning parameter for said tunable local oscillator is also based upon said reference signal.

4. A radio-frequency receiver as claimed in claim 1 wherein said process-invariant circuit comprises a crystal oscillator.

5. A radio-frequency receiver as claimed in claim 1 wherein said process-invariant circuit comprises a bandgap-referenced DC voltage source formed on said substrate.

6. A radio-frequency receiver as claimed in claim 1 wherein:

said intermediate frequency filter is formed on said semiconductor substrate using a capacitor-forming semiconductor process; and

said process-variant circuit is formed on said semiconductor substrate using said capacitor-forming semiconductor process.

7. A radio-frequency receiver as claimed in claim 1 wherein said process-variant circuit comprises:

a capacitor; and

a resistor coupled to said capacitor so that a charge rate of said capacitor after said process-variant circuit is initialized by said control circuit is responsive to an actual resistance value exhibited by said resistor as a result of said resistance-forming semiconductor processes.

8. A radio-frequency receiver as claimed in claim 7 wherein:

said tunable local oscillator is configured so that said radio-frequency receiver receives signals in a plurality of diverse frequency channels;

said process-variant circuit generates a test signal which is responsive to said charge rate of said capacitor; and

said control circuit configures said tuning parameter for a lower than nominal local oscillator frequency when said test signal indicates a charge rate less than a predetermined nominal charge rate of said capacitor.

9. A radio-frequency receiver as claimed in claim 1 wherein said intermediate frequency filter comprises a plurality of filter capacitors and a plurality of filter resistors coupled together to form a bandpass filter.

10. A radio-frequency receiver as claimed in claim 1 wherein said intermediate frequency filter and said process-variant circuit are located proximate one another on said semiconductor substrate.

11. A radio-frequency receiver as claimed in claim 1 wherein:

said tunable local oscillator is tuned so that said radio-frequency receiver receives signals in a plurality of diverse frequency channels spaced a predetermined frequency difference apart; and

said tunable local oscillator is configured to be tunable in steps less than said predetermined frequency difference.

12. A radio-frequency receiver as claimed in claim 11 wherein said tunable local oscillator is configured to be tunable in steps of less than ten percent of said predetermined frequency difference.

13. A radio-frequency receiver as claimed in claim 1 wherein said downconversion mixer, said tunable local oscillator, and said control circuit are formed on said substrate.

14. A radio-frequency receiver as claimed in claim 1 wherein said intermediate frequency filter is a non-tunable filter.

15. A method of tuning to a desired frequency channel a radio-frequency receiver having a common semiconductor substrate on which an intermediate frequency filter and a process-variant test circuit are formed, said method comprising:

operating said process-variant test circuit to estimate an actual center frequency of said intermediate frequency filter;

forming a tuning parameter in response to said estimated actual center frequency and said desired frequency channel; and

applying said tuning parameter to a tunable local oscillator which generates a local oscillator signal that, when mixed in a downconversion mixer with an RF signal from said desired frequency channel, generates an IF signal exhibiting approximately said actual center frequency of said IF filter.

16. A method as claimed in claim 15 wherein:

said intermediate frequency filter and said process-variant circuit are formed on said common substrate through the performance of a resistor-forming semiconductor process;

said operating activity causes said process-variant circuit to generate a test signal;

said operating activity comprises generating a reference signal from a process-invariant circuit, said process-invariant circuit being configured so that said reference signal is substantially unaffected by variations in said resistor-forming semiconductor process; and

said forming activity forms said tuning parameter in response to said test signal and said reference signal.

17. A method as claimed in claim 15 wherein:

said intermediate frequency filter comprises a plurality of filter capacitors and a plurality of filter resistors coupled

together to form a bandpass filter having an actual center frequency different from a nominal center frequency of said intermediate frequency filter;

said process-variant circuit comprises a test capacitor coupled to a test resistor so that an actual charge rate of said test capacitor, which is different from a nominal charge rate of said test capacitor, is exhibited after initialization of said process-variant circuit;

said operating activity comprises generating a test signal which is responsive to said actual test capacitor charge rate; and

said forming activity comprises identifying a nominal tuning parameter for said desired frequency channel, said nominal tuning parameter being associated with said nominal charge rate of said test capacitor, and adjusting said nominal tuning parameter in response to said test signal.

18. A method as claimed in claim 17 wherein said forming activity forms a lower than nominal tuning parameter when said test signal indicates an actual test capacitor charge rate less than said nominal test capacitor charge rate.

19. A method as claimed in claim 15 additionally comprising repeating said operating, forming, and applying activities to track changes in said actual center frequency of said IF filter.

20. A method of operating an integrated radio-frequency receiver comprising:

activating an intermediate frequency filter and a process-variant circuit, said intermediate frequency filter and said process-variant circuit being formed on a common semiconductor substrate using a common resistor-forming semiconductor process;

activating a control circuit, a tunable local oscillator, and a downconversion mixer;

initializing said process-variant circuit from said control circuit;

monitoring performance of said process-variant circuit in said control circuit;

determining a tuning parameter for said tunable local oscillator in response to said monitoring activity; and

applying said tuning parameter to said tunable local oscillator so that said local oscillator generates a local oscillator signal oscillating at a frequency which causes said downconversion mixer to generate an IF signal exhibiting a frequency approximately equal to a center frequency of said intermediate frequency filter.

21. A method of tuning to a desired frequency channel a radio-frequency receiver having a common semiconductor substrate on which a tunable local oscillator circuit, a down-conversion mixer, an IF filter, and a process-variant test circuit are formed, said method comprising:

initializing said process-variant test circuit to generate a test signal;

generating a reference signal from a process-invariant circuit;

estimating an actual center frequency of said IF filter in response to said test signal and said reference signal;

identifying said desired frequency channel; and

tuning said tunable local oscillator circuit in response to said estimating and identifying activities so that in response to receiving an RF signal from said desired frequency channel, said downconversion mixer generates an IF signal at approximately said actual center frequency.